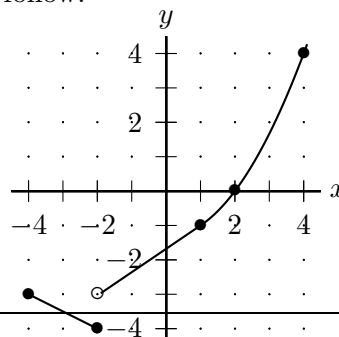


4. [11 points] Invertible functions q , n , and h are described by the table, formula, and graph below. Use this information to answer the questions that follow.

x	-4	-1	0	1	4
$q(x)$	10	1	-1	-2	-4

$$n(t) = 3 - 2t$$



- a. [3 points] Based on the data in the table above, determine which of the following statements could be true about the function q on the entire interval from $x = -4$ to $x = 4$. (Circle ALL such statements or circle NONE OF THESE.)

q is an increasing function.

q is concave up.

q is a decreasing function.

q is concave down.

q is a linear function.

NONE OF THESE

- b. [5 points] Evaluate each of the following.

(i) $h(-2) - 2q(-4)$

(ii) $5q^{-1}(1)$

Solution: From the graph, we see $h(-2) = -4$. From the table, we see that $q(-4) = 10$. So

$$h(-2) - 2q(-4) = -4 - 2(10) = -24.$$

Solution: From the table, we see that $q^{-1}(1) = -1$. So

$$5q^{-1}(1) = 5(-1) = -5.$$

Answer: -24

Answer: -5

(iii) $q(q(q(0)))$

(iv) $n(h^{-1}(-3))$

Solution: From the table, we see that $q(0) = -1$, $q(-1) = 1$, and $q(1) = -2$. Thus

$$q(q(q(0))) = q(q(-1)) = q(1) = -2.$$

Solution: From the graph, we see that $h^{-1}(-3) = -4$. Hence

$$n(h^{-1}(-3)) = n(-4) = 3 - 2(-4) = 11$$

Answer: -2

Answer: 11

- c. [3 points] Find a formula for $4n(n(t))$. Simplify your answer completely.

Solution:

$$4n(n(t)) = 4n(3 - 2t) = 4(3 - 2(3 - 2t)) = 4(3 - 6 + 4t) = 4(-3 + 4t) = -12 + 16t$$

Answer: $4n(n(t)) =$ 16t - 12